eccentric non-dilated hypertrophy (ENDH) [n = 67]: RWT < 0.45 and LV dimension < 3.1 cm/m$^2$. Comparing LVH v. non-LVH S, stroke volume index (SVI), stroke work index (SWI), minute work index (MWI) and end systolic stress (ESS) were significantly greater p < 0.01 in the non-LVH group. Total peripheral resistance (TPR) and ESS/ESVI, a measure of inotropic state, was greater in the LVH group (p < 0.001). Comparisons of LVH remodeling subgroups indicated significant intragroup differences for SVI, SWI, MWI, TPR, peak systolic stress (PSS), ESS, and ESS/ESVI. SVI, MWI and MWI, PSS and ESS were highest in the EDH group, and TPR and ESS/ESVI were highest in the DSH group. No inter- or intragroup differences were noted for fractional shortening or circumferential fiber shortening. These results demonstrate that in Stage I hypertensives, differences in LV performance measures and hemodynamics are present in comparison of LVH v. non-LVH, and by type of LVH remodeling.

## 901-82 Effects of Transdermal Estradiol-17$\beta$ on Hypertension in Postmenopausal Women

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Estrogen replacement therapy (ERT) with estradiol-17$\beta$ ($E_2\beta$) has effects on cardiovascular haemodynamics and protects against the development of both cardiovascular diseases and stroke.

We studied 10 postmenopausal women (mean age 52.2 ± 2.4 years; $E_2\beta$ plasma concentrations < 25 pg/ml; time-lapse from menopause 2–4 years) with mild hypertension (SBP 172 ± 19, DBP 99 ± 5 mmHg) and without target organ complications. The women showed no evidence of cardiovascular or other systemic diseases. All subjects complained of menopausal symptoms. None was taking hormone replacement therapy nor assuming antihypertensive drugs or other medications which would affect cardiovascular activity. According to a randomized, double-blind protocol they received patches of transdermal $E_2\beta$ (rated to assure plasma levels of $E_2\beta$ > 75 pg/ml) or matched placebo, with crossover after a 1 week washout period. A 24-hour ambulatory BP monitoring was performed at baseline and after $E_2\beta$ or placebo administration. Results were as follows:

| | Mean daytime | | | Mean nighttime | | |
|---|---|---|---|---|---|---|
| | HR (b/min) | SBP (mmHg) | DBP (mmHg) | HR (b/min) | SBP (mmHg) | DBP (mmHg) |
| Placebo | 76 ± 10 | 174 ± 21 | 99 ± 8 | 64 ± 5 | 164 ± 11 | 90 ± 10 |
| $E_2\beta$ | 75 ± 11 | 151 ± 13* | 91 ± 8* | 64 ± 8 | 142 ± 15** | 81 ± 5* |

Data are means ± SD; *p < 0.05; **p < 0.01 vs. placebo

Menopause ERT is a physiological rather than a pharmacological approach. Our preliminary data show that ERT have beneficial effects in both lowering elevated BP levels and maintaining an uniform BP control over 24 hours. The finding that HR was unchanged after $E_2\beta$ administration seems to suggest an immediate effect of the hormone on the arterial wall. In our opinion, ERT could be considered when significant changes in BP take place in the postmenopausal period and are associated with signs or symptoms of hormone deprivation.

## 901-83 Echocardiographic Left Ventricular Hypertrophy and the Angiotensin-Converting Enzyme-Gene in Elderly Hypertensives

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*Purpose:* To evaluate the association of the deletion (DD)-type gene for the angiotensin-converting enzyme with left ventricular mass index (LVMi) in elderly with newly-found diastolic (DH) and isolated systolic hypertension (ISH) from a population survey, compared with normotensive controls (Con).

*Introduction:* The DD-genotype is associated with increased risk for myocardial infarction mainly in normotensives, less clearly in hypertensives. In DH, more electrocardiographic (EKG) LV hypertrophy is found in patients with the DD-genotype. In this report, LVMI is measured in hypertensives and normotensives with echocardiography, what is more sensitive than the EKG.

*Methods:* The ACE-genotype was determined with the polymerase-chain reaction in 45 DH-patients (4x diastolic BP (DBP) ≥ 95 mmHg) and 57 ISH-patients (4x systolic BP ≥ 160; DBP < 95 mmHg), and in 67 normotensive controls from a population survey (age 60–74 yrs). LVMI was calculated from posterior wall thickness (PWT) and the end-diastolic dimension (EDD). Also, LV diastolic function (early to atrial (E/A) filling ratio) was measured.

*Results:*

| | genotype | n | BP(mmHg) | LVMI(g/m2) | PWT(mm) | EDD(mm) | E/A |
|---|---|---|---|---|---|---|---|
| DH | II/ID | 32 | 161/99 | 93.1 | 10.1 | 44.6 | 0.89 |
| | DD | 13 | 157/98 | 81.6* | 9.2* | 43.9 | 0.86 |
| ISH | II/ID | 42 | 175/88 | 99.9 | 10.1 | 45.4 | 0.82 |
| | DD | 15 | 176/87 | 89.4(*) | 10.1 | 43.7(*) | 0.82 |
| Con | II/ID | 53 | 135/81 | 73.0 | 8.5 | 43.8 | 0.88 |
| | DD | 14 | 138/82 | 72.2 | 8.3 | 43.7 | 0.86 |

*p < 0.05, (*)p < 0.10. Age and gender: no differences.

*Conclusions:* In both hypertensive groups, patients with the DD-genotype show a smaller increase of echocardiographic LVMI, despite comparable levels of blood pressure and LV diastolic function. This may explain why the DD-genotype is more associated with cardiovascular risk in normotensives rather than in hypertensives.

# INTRALUMINAL ULTRASOUND/ANGIOSCOPY

## 901-84 High Resolution Vascular Imaging With Optical Coherence Tomography

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Optical coherence tomography (OCT) is a recently developed technology which uses reflected infrared light to produce micron scale imaging. OCT is analogous to conventional ultrasound using infrared light rather than acoustical waves. In this work, we directly compare muscular arteries (medium and large), elastic arteries, and venous bypass grafts for their imaging properties. Arterial and venous tissue were obtained immediately postmortem. Two dimensional cross sectional images of these tissues were generated by an OCT system with a 1300 nm diode. After imaging, the microstructure was confirmed by routine histologic processing of the tissue. The axial resolution of OCT was demonstrated to be 16 ± 1 $\mu$m. The dynamic range was 109 dB. Penetration was possible completely through normal coronary arteries but only partially through aorta or carotid arteries. The internal and external elastic membrane could be demonstrated in muscular arteries. The intima-media and media-adventitial borders were well demarcated in muscular arteries. OCT represents a promising new technology for intraarterial imaging due to its high resolution, ability to generate contrast within arterial walls, and the fiber optic design which is compatible with intravascular catheters.

## 901-85 Can Radiofrequency Data Analysis of Intravascular Ultrasound Accurately Characterize Coronary Atherosclerosis?

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To determine whether spectral analysis of the unprocessed radiofrequency (RF) signal from an IVUS scanner offers advantages over videodensitometric analysis of vessel wall morphology, 57 regions of interest (ROI) were analysed from 5 post-mortem pressure perfused (80 mmHg) coronary vessels imaged in a saline bath. These were imaged at 30 MHz and the RF data was digitised at 250 MHz. ROI were identified from scan-converted images and the relative amplitudes of different frequency components were analysed. The spectra were normalised by data acquired from a perfect specular reflector, enabling spectral slope (dB/MHz) to be calculated over a given bandwidth (17–42 MHz). 3-dimensional (3-D) RF images were constructed and compared with 3-D comparative histology derived from microscopy and radiologic teachniques. Dense fibrotic (DFP) and calcified plaques (CaP) showed similar mean backscattered energies (mBE), but the gradient of the spectral slope (Gr) was higher in CaP (−0.43 ± 0.1) than in DFP (−0.29 ± 0.1) (p = 0.004). Loose fibrotic plaque (LFP) was identified from moderate fibrosis (MFP) and DFP with mBE, Gr and y-axis intercept, MFP from DFP with Gr and intercept (p < 0.001). MBE was higher in smooth muscle cells (SMC −18.2 ± 0.9) than in the foam cells (−24.4 ± 0.1 dB) and in LFP with lipid (−23.2 ± 0.4 dB) (p < 0.001). These preliminary results demonstrate that spectral slope may be used to identify different plaque types and for quantitative analysis of vessel wall morphology.

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